REMARKS

The above amendments to the above-captioned application along with the following remarks are being submitted as a full and complete response to the Official Action dated January 24, 2006. In view of the above amendments and the following remarks, the Examiner is respectfully requested to give due reconsideration to this application, to indicate the allowability of the claims, and to pass this case to issue.

Status of the Claims

Claims 42-58 are under consideration in this application. Claims 42 and 51 are being amended, as set forth above and in the attached marked-up presentation of the claim amendments, in order to more particularly define and distinctly claim Applicants' invention.

All the amendments to the claims are supported by the specification. Applicants hereby submit that no new matter is being introduced into the application through the submission of this response.

Prior Art Rejections

Claims 42-58 were rejected under 35 U.S.C. § 102(e) as being unpatentable over US Pat. No. 5,103,328 to Numao (hereinafter "Numao"). The prior art reference Numao (US 6,803,901), Miyazawa (US 6,577,292), Okada et al. (US 4,958,915) and Yamamoto et al. (US 6,756,954) were cited as being pertinent to the present application. This rejection has been carefully considered, but is most respectfully traversed in view of the claims currently on file, as more fully discussed below.

The liquid display device of the invention (e.g., the embodiments depicted in Figs. 1 & 9; p 48, last paragraph to p 49, 2nd paragraph), as now recited in claim 42, comprises: a liquid crystal display panel; and a backlight unit. The backlight unit repeats lighting and extinguishing a backlight 300 at a constant refresh rate (i.e., how often a screen is illuminated; Figs. 1 & 9) such that a lighting time period is shorter for a motion picture image with a fast-moving subject captured therein (e.g., Figs. 1E & 9E; p. 49, 2nd paragraph; "*when a moving subject to be displayed moves from one position to another position*" p. 3, lines 8-9) than for a motion picture image with a slow-moving subject captured therein (e.g., Figs. 1C & 9C; p. 48, last paragraph; p. 51, last paragraph). The motion picture images have an identical frame rate (i.e., how often the image being displayed can change; Synchronous Signal Vsync in Figs. 1A & 9A).

The invention, as now recited in claim 51, is also directed to a liquid display device with the backlight unit controlling a backlight 300 to maintain lighting at a constant light amplitude for a still picture image (Figs. 1B & 9B) with a non-moving subject captured therein, and repeats lighting and extinguishing for a moving picture image with a moving subject captured therein (Figs. 1C-1E, 9C-9E). The still and moving picture images have an identical frame rate.

It is important to distinguish between refresh rate (how often a screen is illuminated), and frame rate (how often the image being displayed can change). Motion picture film has a standardized frame rate of 24 hz, meaning that there are 24 photographs projected in each second. However, to reduce the flicker that such a low refresh rate would cause, each image is illuminated/refreshed twice before the film advances to the next frame. As a result, a viewer does not notice the 48 black periods per second anymore. Since flat panel displays use Active-matrix liquid crystal displays which use a transistor for each pixel make the pixel keep it's state, they show flicker from the backlight.

The invention enhances the discrimination of the motion pictures such that the degree of discrimination can be held at the same level irrespective of the speed of the moving subject captured in the images. In the motion picture displaying modes (modes (2) to (4)), the lighting and the extinguishing of the backlight are repeated such that the power consumption is reduced (p. 50, lines 3-10).

Applicants contend that one of the cited references teaches or suggest (1) "repeats lighting and extinguishing a backlight at a constant refresh rate such that a lighting time period is shorter for a motion picture image with a fast-moving subject captured therein than for a motion picture image with a slow-moving subject captured therein, while the motion picture images having an identical frame rate" or (2) "maintaining lighting at a constant light amplitude for a still picture image with a non-moving subject captured therein, and repeating lighting and extinguishing for a moving picture image with a moving subject captured therein, while the still and moving picture images having an identical frame rate" as the invention.

In contrast, the relevant portion in Numao (col. 3, lines 1-12) as relied upon by the Examiner (p. 2, 2nd paragraph in the paragraph number 2 of the outstanding Office Action) only compares "a frame period T*F* 0.08 second (col. 2, line 31) of not using a backlight" with "a frame period T*F* 0.16 second (col. 3, line 11) of using a backlight" as 1: 2, when a backlight-on period to a backlight-off period is 1:1 (col. 3, lines 3-5). As such, the movement

of a subject in the same motion picture becomes slower as visually apprehended via a display in the with-backlight situation than in the without-backlight situation (col. 3, lines 8-12). In other words, the comparison of the prior art in Numao is between with and without a back light, rather than between a short and a longer lighting time period for lighting and extinguishing the same backlight lightened at a constant refresh rate for a motion picture image with a fast-moving subject captured therein vs. a motion picture image with a slow-moving subject captured therein while the motion picture images have an identical frame rate as the invention.

A time period needed for selecting all of the scanning electrodes sequentially defines a frame period T*F* (col. 2, lines 15-17). To bring one of the picture elements into a bright state, it is necessary to apply the voltages Vc and Vs to the corresponding electrodes 4 and 7 so as to satisfy an equation (1) (or (2)) for $\pi 0$ seconds or more. In order to bring one of the picture elements into a dark state, it is necessary to keep another equation (2) (or (1)) for $\pi 0$ seconds or more. When a ferroelectric liquid crystal having the time interval $\pi 0$ =100 micro seconds and the number of the scanning electrodes is 400, the frame period T*F* is 0.08 seconds (col. 2, lines 27-30). If a backlight on period to a backlight off period is 1:1, the frame period T*F* of a LCD display with a backlight is twice as long as a LCD display device without a backlight (col. 3, lines 3-8). If the time interval $\pi 0$ =100 micro seconds and the number of the scanning electrodes is 400 as described above, the frame period T*F* becomes 0.16 seconds, resulting in that the movement of the images becoming slow as visually apprehended in a moving image display (col. 3, lines 8-12).

In the prior art described in Numao, the movement of a subject in the same motion picture becoming slower as visually apprehended in the with-backlight situation is a result/drawback of using a backlight. On the other hand, the invention applies lighting time periods of different lengths of a backlight lightened at a constant refresh rate for two different motion pictures with an identical frame rate: one with a fast-moving subject captured therein and the other with a slow-moving subject captured therein.

As to Numao, it uses a light shutter arranged between the liquid crystal layer and the light source for shading the light incident to the picture elements being rewritten from the light source (col. 3, lines 39-42) to prevent flicker (col. 3, lines 15-18), rather than manipulating a lighting time period of the backlight to hold a degree of discrimination at the same level irrespective of the moving speed of a subject captured in the images and to reduce power consumption as the invention. Numao simply does not vary a lighting time period of

the backlight according to a moving speed of a subject in a motion picture as does the invention.

Applicants contend that Numao fails to teach or suggest each and every feature of the present invention as recited in independent claims 42 and 51. As such, the present invention as now claimed is distinguishable and thereby allowable over the rejections raised in the Office Action. The withdrawal of the outstanding prior art rejections is in order, and is respectfully solicited.

Conclusion

In view of all the above, clear and distinct differences as discussed exist between the present invention as now claimed and the prior art reference upon which the rejections in the Office Action rely, Applicant respectfully contends that the prior art references cannot anticipate the present invention or render the present invention obvious. Rather, the present invention as a whole is distinguishable, and thereby allowable over the prior art.

Favorable reconsideration of this application is respectfully solicited. Should there be any outstanding issues requiring discussion that would further the prosecution and allowance of the above-captioned application, the Examiner is invited to contact the Applicant's undersigned representative at the address and telephone number indicated below.

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